REMARKS

Claims 1-16 are pending in the application with Claims 17-21 withdrawn from consideration due to a restriction requirement. Claims 1 and 16 are the only independent claims.

Claims 1-16 were rejected under Section 103(a) as being unpatentable over US Patent 4,893,160 (Ishieh et al.) in view of US Patent 6,251,730 (Luo) and further in view of Applicants' alleged admitted prior art (APA). This rejection is respectfully traversed and reconsideration is requested.

Independent Claim 1 is directed to a trench MOSFET transistor device having a silicon substrate of a first conductivity type, a silicon epitaxial layer of the first conductivity type over the substrate, the epitaxial layer having a lower majority carrier concentration than the substrate, a trench extending into the epitaxial layer from an upper surface of the epitaxial layer, an insulating layer lining at least a portion of the trench and a conductive region within the trench adjacent the insulating layer. The device further includes a body region of a second conductivity type provided within an upper portion of the epitaxial layer and adjacent the trench, a source region of the first conductivity type provided within an upper portion of the body region and adjacent the trench, and an upper region of second conductivity type within an upper portion of the body region and laterally adjacent the source region, wherein the upper region does not extend to the trench, and wherein the upper region has a higher majority carrier concentration than the body region. Finally, Claim 1 recites a source contact region disposed on the epitaxial layer upper surface, the source contact region comprising: (a) a doped polycrystalline silicon contact region in electrical contact with the source region and (b) a metal contact region adjacent the doped polycrystalline silicon contact region and in electrical contact with the source region and with the upper region.

Each of independent Claims 1 and 16 recites that the trench MOSFET transistor device has an upper region of second conductivity type within an upper portion of the body region and *laterally* adjacent the source region, *wherein the upper region does not extend to the trench*, and wherein the upper region has a higher majority carrier concentration than the body region.

The Final Action acknowledges that Hshich and Lou *fail to disclose* "an upper region of second conductivity type (within an upper portion of the body region and) *laterally* adjacent the source region, *wherein the upper region does not extend to the trench*". The Action takes the position that Applicants alleged "admitted prior art" "discloses an upper region 139 of second conductivity type laterally adjacent the source region 140, wherein the upper region 139 does not extend to the trench".

The Final Action then somehow assumes that it would have been obvious to one of ordinary skill in the art to "form the Hshieh and Luo's device having an upper region of second conductivity type laterally adjacent the source region, wherein the upper region does not extend to the trench", "such as taught by APA *in order to reduce the contact resistance between the source metal and the source region 140*".

Applicants respectfully submit that it would in *no way* be "obvious" to combine the alleged teachings in the manner suggested, when in fact, Hshieh specifically teaches *away from any such modification or combination of its teachings*. Applicants respectfully direct the Examiner to the Abstract and col. 10, lines 7-9 of Hshieh, which specifically recites that the second region is "disposed above the first region and adjacent *and extending to an outer wall of one of the plurality of trenches*".

Hshieh recites that the N+ source regions 214 are formed "*within upper portions of the P regions 212 by an implantation and diffusion process*" (col. 9, lines 1-3); that "N+ source regions 214 typically extend to a depth of 0.3 to 0.45 microns" (col. 6, lines 23-25) and that the "P regions 212 typically extend into the epitaxial layer to a depth of 1.5 to 1.7 microns" (col. 5, lines 48-50).

A goal of the MOSFET's of Hshieh '678 is to provide low on-resistance in trench DMOS devices by increasing cell density and NOT allow any detrimental changes in connection with "device threshold voltage, gate charge, and/or termination-area device breakdown voltage" (col. 2, lines 14-19). The P regions 212 are created "to provide the desired device threshold voltage" (col. 8, lines 56-58). Hshieh further states that in the prior art device, the P+ region eventually diffuses laterally into the channel region, increasing the threshold voltage of the device in *contrast, in Hshieh's device, "because a deep P+ region is avoided, the process does not encounter such difficulties*" (col. 8, lines 59-65).

Finally, with respect to the reliance in the Action of the alleged "obvious" modification/ combination to "form Hshieh's device" having the recited source contact region allegedly taught by Luo, "in order to expose a peripheral area of the doped source portion formed in the body", Applicants respectfully request some type of clarification in the next communication. Specifically, *why* would one skilled in the art be motivated *to modify the teachings of Hshieh to "expose a peripheral area of the doped source portion"*, and, even more specifically, to include a "source contact region....laterally adjacent the insulating region, the source contact region comprising: (a) a doped polycrystalline silicon contact region having N-type doping and (b) a metal contact region adjacent the doped polycrystalline silicon contact region and in electrical contact with the source region and with the upper region?

Of course the motivation to modify the prior art must flow from some teaching in the art that suggests the desirability or incentive to make the modification needed to arrive at the claimed invention. In re Napier, 34 USPQ2d 1782, 1784 (Fed. Cir. 1995). The mere fact that the prior art could be so modified would not have made the modification obvious unless the prior art suggested the desirability of the modification." In re Laskowski, 10 USPQ2d 1397, 1399 (Fed. Cir. 1989). The requisite motivation must come from the prior art and not Applicants' specification. In re Dow Chem. Co., 5 USPQ2d 1529, 1531-32 (Fed. Cir. 1988). Here, Hshieh, Luo and APA, at least, plainly fail to suggest the claimed combination.

For all of the foregoing reasons, Applicant respectfully submits that each of independent Claims 1 and 16 are not rendered obvious or unpatentable over any permissible combination of the teachings of Hshieh '678, Luo and APA and that the rejection should be withdrawn.

Dependent Claims 2-15 are believed to be clearly patentable for all of the reasons indicated above with respect to amended independent Claim 1, from which they depend, and even further distinguish over the cited references by reciting additional distinguishing limitations.

Since the Applicants have fully responded to each rejection set out in the Office Action, it is respectfully submitted that in regard to the above remarks that the pending application is patentable over the art of record. Should the Examiner be of the view that an interview would expedite consideration of this Response or of the application at large, request is made that the

Examiner telephone the Applicants' undersigned attorney at (908) 518-7700 in order that any outstanding issues be resolved.

Respectfully submitted,

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